

أجب عن الأسئلة التالية:

- 1) a. Define M.S X and give 3 examples .
b. Define H.S X and give 2 examples .

2) a. $x_n \rightarrow x \iff \dots \iff \dots \iff \dots$

b. $\{x_n\}$ is C.seq $\iff \dots \iff \dots \iff \dots$

c. P.t $d(x,y) = \sqrt{|x-y|}$ is dist. F in R.

- 3) a. Give 3 examples of N.S X .

b. P.t $x \perp y \iff \|x-3y\|^2 = \|x\|^2 + 9\|y\|^2$.

4) a. $\|x-3y\|^2 + \|x+3y\|^2 = \dots + \dots$.

b. $(x-3y, x+3y) = \dots - \dots$.

c. Solve I.E $y^2(x) = 25 - 6 \int_2^x y(t) dt$.

- 5) a. P.t $F(x) = (x,y)$ is B.F - L.F - C.F in H.S X .

b. P.t $Ay(x) = C + \frac{3}{5} \int_0^x y(t) dt$ is contra.Op in $C[0,1]$.

مع أطيب التمنيات بالنجاح .. د. سعيد أحمد أبو العلا واللجنة

Handwritten signature



TANTA UNIVERSITY			
FACULTY OF SCIENCE			
DEPARTMENT OF MATHEMATICS			
FINAL EXAM FOR FOURTH LEVEL (MATH STUDENTS)			
COURSE TITLE: NUMERICAL ANALYSIS (2)		COURSE CODE: MA4109	
DATE: 31/12/2014	TERM: FIRST	TOTAL ASSESSMENT MARKS: 150	TIME ALLOWED: 2 HOURS

Answer the following questions:

- (I) (a) Find the general solution for the following difference equation:
$$f(x+4) - \frac{5}{4}f(x+3) + \frac{5}{2}f(x+1) - f(x) = 1 ;$$
$$f(0) = 0, f(1) = 11, f(2) = -8, f(3) = 6 . \quad (20 \text{ marks})$$
- (b) Discuss the stability for the following numerical procedure with respect to its initial values:
$$y_n - y_{n-3} = \frac{3h}{8} [f(x_{n-3}, y_{n-3}) + 3f(x_{n-2}, y_{n-2}) + 3f(x_{n-1}, y_{n-1})], n \geq 3. \quad (20 \text{ marks})$$

- (II) (a) Apply the method of nets to compute the numerical solutions for the following mixed problem:
$$\frac{\partial^2 u}{\partial t^2} - \frac{\partial^2 u}{\partial x^2} = t + x - 1,$$
$$u(x, 0) = \ln(3-x), \frac{\partial u(x,0)}{\partial t} = 0 \quad (0 \leq x \leq 1);$$
$$u(0, t) = \ln 3, u(1, t) = \ln 2, h = 0.05 . \quad (20 \text{ marks})$$
- (b) By the method of finite differences, find the numerical solutions for the following linear boundary value problem:
$$y'' + (1+x^2)y' - xy = 0, x \in [0, 1.5]; y(1) = 0, y(1.5) = 1.62, h = 0.01 . \quad (15 \text{ marks})$$

- (III) (a) Define: An interior nodal point - The collocation points - The iterated and the degenerate kernels - The Dirichlet problem. (15 marks)
- (b) Find an approximate solution for the following Fredholm's integral equation:
$$x(t) = t^2 - 2 + \int_0^1 (s+1) e^{-ts^2} x(s) ds, t \in [0,1]. \quad (20 \text{ marks})$$

- (IV) (a) Making use the collocation method, derive an approximate analytical solution for the following boundary value problem:
$$x^2 y'' - xy' + 2y = x^2, x \in [-1, 0]; y(-1) = y(0) = 0 . \quad (20 \text{ marks})$$
- (b) Define ill and well conditioned problems and whence discuss the stability of the following initial value problem with respect to its initial condition:
$$y'(x) = -[y(x)]^2, 0 \leq x \leq b ; y(0) = 1 . \quad (20 \text{ marks})$$

EXAMINERS	PROF. DR. A. R. M. EL-NAMOURY	DR. M. A. SERWAH
------------------	--------------------------------------	-------------------------

With our best wishes

٤

جامعة طنطا امتحان الفصل الدراسي الأول

المستوى الثالث- علوم الحاسب
المادة: توبولوجي وجبر حديث

٢٠١٥-٢٠١٤ كلية العلوم

(MA4121)

الزمن: ساعتان

قسم الرياضيات

Modern Algebra.

Answer the following:

1- Show that $Z[x]$, the set of all polynomials in an indeterminate x with integral coefficients, is a commutative ring with no zero divisors. (10 marks).

2- Let $\varphi: (C; +, \cdot) \rightarrow (M_2(R)); +, \cdot$

$a+ib \rightarrow \begin{bmatrix} a & b \\ -b & a \end{bmatrix}$ be a map from the field of complex numbers into the ring of all square matrices of degree 2 with real entries. Show that φ is a ring homomorphism. Find the kernel of φ . Is φ onto? (10 marks).

3- Prove that if φ is a ring homomorphism, then $\ker \varphi$ is an ideal. (10 marks).

4- Determine all ideals that contain the integer 6, and those that contain the integer 8, then deduce the ideal generated by the two integers $\{6,8\}$. (10 marks).

5- Find out the zeros of the polynomial $x^4 + 4x^3 + 6x^2 + 2x + 3 \in Z_8[x]$, then factorize the polynomial as a product of two polynomials of less degrees. (10 marks).

WiThBeStWisHes

